ON SCENE

THE NATIONAL MARITIME SAR REVIEW

DEPARTMENT OF TRANSPORTATION

U.S. COAST GUARD

ISSUE NO. 1–79

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AN INTERNATIONAL MARITIME SAR PLAN

A special Working Group of SAR Experts of the Inter-Governmental Maritime Consultative Organization (IMCO) has completed its work of designing an International Maritime SAR Plan. The plan consists of:

1. A draft International Convention on Maritime Search and Rescue consisting of:
   a. Legal Articles, and
   b. Technical Annex
2. Supplementary guidance manuals consisting of:
   a. IMCO SAR Manual (for maritime SAR organizations)
   b. Merchant Ship SAR Manual (for ships at sea)

The draft convention will be acted upon by an international conference in Hamburg in April 1979. The two guidance manuals have already been approved for issue. The second edition of MERSAR has already been issued, and the IMCO SAR Manual is expected to be published in late 1979.

ON SCENE is a SAR publication published by the Commandant, U. S. Coast Guard as a source of information concerning current and proposed procedures as well as new developments in SAR. Articles contained herein are non-record and non-directive.

SAR CASE STUDY

The case began early on a Tuesday morning when an outbound ship reported to the Coast Guard that it had sighted a small boat just outside the harbor firing red flares. Vessels proceeding in and out of the harbor were requested to keep a lookout for the boat. One of these, a pilot boat reported a short time later that he had the 20 foot boat in sight. It was a white inboard/outboard, it had lost power, and it was presently anchored. Although the boat was in no immediate danger, the master of the pilot boat thought it would be prudent to assist immediately because the small craft was unlighted and in danger of being run down.

INITIAL ACTION

A 40 foot boat was sent to the scene to tow the boat to port. Upon arrival on scene, it was unable to locate the disabled craft. On the assumption that it might have dragged anchor, the 40 footer began searching down drift. The effort continued until daylight, when the search was suspended by the RCC on the assumption that the boat had effected repairs or had been assisted by another boat. This proved to be a faulty assumption.

THE EXTENDED SEARCH

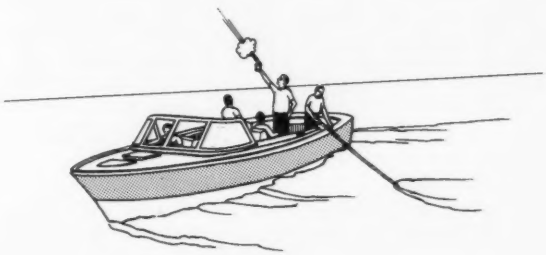
Late that same afternoon, the wife of the owner/operator reported the boat overdue from a fishing trip. The operator's car was found at the marina of departure, confirming his non-return.

A helicopter was launched but was hampered in its search by thundershowers in a portion of the search area.

On Wednesday, helicopters and a UTB extended the search. On Thursday a C-130, a cutter and the CAP joined the search. On Friday, a full day's search resulted in a cumulative total of 16,000 square miles searched, 17 sorties, 60 hours search hours, and in a 98% cumulative probabilty of detection. At this point the search was suspended. About 0800 the following Sunday a merchant ship sighted the boat and rescued the persons on board.

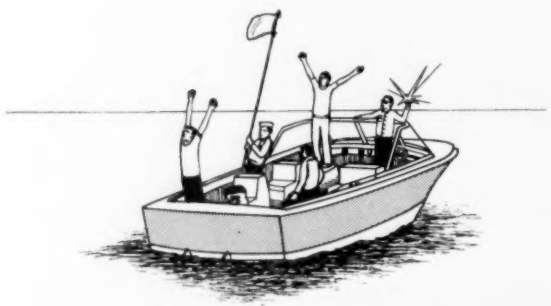
THE OPERATOR'S STORY

The Owner/Operator was debriefed on the events that took place. He and four others departed a local marina on Monday to go fishing off the harbor entrance. Early Tuesday morning the boat developed battery problems and the engine failed to start. They began drifting approximately one mile off the entrance. A small ten pound anchor supposedly with 500 feet of line failed to hold them. Upon seeing an outbound ship from the harbor they used all three of their red flares to signal the ship. The pilot boat later came alongside and advised them he would notify the Coast Guard. After this the pilot



boarded an inbound ship. While entering the harbor the ship shined a spotlight on them. The ship entered the harbor and the pilot boat followed it in. Later in the morning, while it was still dark, the operator saw the Coast Guard boat searching for them but he was always to the west of the search unit. On the afternoon of the same day they tried to use their small auxiliary engine to head west and in toward the beach. Due to rough sea conditions they made little progress and the auxiliary finally failed. Later in the afternoon they were able to anchor but were able to hold for only a few hours. During the time they were anchored, they saw a Coast Guard helicopter flying north of them. The weather at this time was very cloudy with rain squalls in the area. They could see the lights on shore and also noticed that they began drifting more offshore.

On Wednesday the anchor remained over the side but did not hold. During the evening they could see the lights on shore. On Thursday they were still drifting with the anchor line tending upwind over the bow, and the boat drifting downwind. The operator reported seeing the cutter pass abeam of them approximately one mile away at about sunset. On Friday at approximately 0900 they saw a Coast Guard helicopter at some distance from them. The helicopter was heading back to shore. They could not see the numbers on the helo. The operator stated that at approximately 1200, a Coast Guard helicopter came out from shore, banked to the left, flew directly over the boat, then headed towards shore. They could see the numbers on the helicopter and the pilot's helmet. They thought they had been sighted. He noticed that the current increased late Friday and they could not see the lights on shore Friday evening. On Saturday the seas finally calmed and there were few whitecaps. He also pulled up the anchor on this day. At approximately 1700 a tanker passed within a 1/4 mile of them but they were not seen. The night was calm with a full moon. On Sunday at approximately 0800 another tanker came within 1/4 mile of them, saw them and picked them up.



The persons on board had a piece of broken glass and a shiny piece of metal with which they attempted to signal when units were near them and the sun was out. Until Friday however, the overcast conditions precluded them from using these instruments. After the weather cleared on Saturday, they attempted to signal the tanker with no success and again used the metal to signal the second tanker. It is not known whether the latter in fact saw a signal. In addition to signaling, they also rigged a lifejacket on a pole and placed it upright on the bow of the boat. A lifejacket was also used to wave when search units were near them. This was done all three times when a helo was sighted and also when the cutter passed nearby. The operator also reported that whenever Coast Guard units were near them the worst possible search conditions existed; rough seas, numerous whitecaps, poor visibility. During their six day ordeal they caught two fish and drank small quantities of sea water (Editor's Note: Drinking sea water is not recommended). They were in reasonably good health when picked up.

ORIGINATOR'S COMMENTS

This case can be divided into two stages: The events that occurred from the time the report was received of the vessel firing flares until the case was suspended on Tuesday morning and the resumption of search efforts after the receipt of the overdue report of the vessel. In the first stage it appears that more vigorous prosecution of the case could have resolved it. While there are some mitigating factors, the decision, or perhaps the indecision, in not dispatching the UTM sooner is considered to have been an error in judgement. The later assumption that the subject had either effected repairs or had been assisted by someone else, is thought to have been, under the circumstances, reasonable.

The second stage of the case lends itself to some study and analysis as to why the target was not located during the subsequent search efforts. The search target was a 26 foot Mariner-type inboard/outboard, all white hull, all white interior. The survivors were wearing clothes that were either white or dark in nature and did not contribute to the detectability of the search target. As stated by the owner and reported by the search units, the weather during this entire period was unfavorable, and the whitecap factor coupled with the color of the target can be seen as the most probable reason as to why the search failed.

Based on the average actual drift, the target is thought to have been in the search area during all searches. Upon completion of search efforts on Friday the case was suspended due to the high cumulative POD for the boat (98%) and the assumption that if the boat had capsized the survivability of the people in the water had expired. With the boat keeping the anchor out for the entire time (except for Saturday), the target approximated the drift of a DMB very closely. Friday, the weather cleared as far as rain and overcast, however due to the buildup of the seas, the whitecaps were still present on the final day of the search.

ORIGINATOR'S RECOMMENDATIONS

Due to the fact that much of our searching is still highly dependent on the human element (i.e., visual searching), this case points out the need for further research into the detectability of targets taking into account their color along with the length, sea conditions, and lighting factor. Information in this case presents favorable facts that show the target was in the areas being searched, but was not located. Due to the weather conditions and the color of the target (all white), it is very possible that the target was mistaken for a whitecap.

With tables that include color, hopefully we will be able to better monitor and compute the POD of particular searches when different colored targets are involved. In the future, if color is entered into the sweep width tables, we may find outselves searching longer for targets of the same length but with different colors. Also, search planners should keep in mind that with the construction standards of today's recreational boats, the possibility of capsizing or sinking of these types of craft is more remote.

SUB-REGIONAL SAR COORDINATOR'S COMMENTS

The district commander commented as follows:

a. Poor judgement was used in delaying the dispatch of a rescue unit. In this area, where there are strong winds and currents, it is critical to respond quickly when the position of a disabled vessel is known.

b. It also appears that poor judgement was used in suspending the case without confirming the safe return of the boat. The name and description had been learned from the pilot.

AREA COMMANDER'S COMMENTS

The area commander commented as follows:

a. Human factors impacting on Search and Rescue efforts are the obvious lessons to be learned from this case. The reliance upon a theoretical POD and the on scene motivation of lookouts also may have contributed to on scene judgements or evaluations. The constant consideration of these factors must occur on each case.

b. In view of the above, it is recommended that this case study be given wide dissemination, with deletions of geographic identification. All SAR personnel will be forcefully reminded of the human factors by this case study without a great deal of amplification.

COMMANDANT'S COMMENTS

The recommendation for tables to include color of the search target in estimates of sweep width is noted. Research is already being done by the Coast Guard R&D Center in this respect in connection with a project which is reviewing the entire theory and practice of probability of detection use in SAR operations. Past efforts were unable to quantify this parameter. Accordingly, unless and until new data is obtained which does quantify it, you should subjectively discount probability of detection for unfavorable colors of search targets, as well as for the human factors mentioned in the Area Commander's endorsement. (Editor's Note: Some questions have been raised about the meaning of "subjectively discount probability of detection for unfavorable colors of search targets, as well as for the human factors ...." It simply means that whenever very unfavorable conditions exist which are known to affect detectability but which can not be quantified, disbelieve the PODs obtained and add extra search for good measure)

SUPPLEMENTAL REPORT

The following supplemental information was later provided by the originator of the study:

a. The SARP program was utilized. DMB drift and local winds were used as input data to the program. The average actual drift of the subject was 289/0.88 kts. The SARP minimax drift during the search indicated 285/1.52 kts. The major reason for this difference appears to be the leeway vector. Actual LW is estimated to have been 0.22 kts (actual drift of 0.88 kts minus DMB drift of 0.66 kts). The SARP LW was shown as 0.91 kts. While some of this difference can be attributed to the vessel deploying an anchor and drifting bow into the wind, the overall difference between the two drift rates remains quite large. SARP was a useful tool that gave fair results.

b. CASP was not used because the case did not lend itself to a wide variety of scenarios (i.e. initial position well known, small initial search area, confidence in drift rates being used). More emphasis was placed on other areas of search planning and coordinating of the search.

AREA COMMANDER'S SUPPLEMENTAL COMMENTS

Based on the supplemental report, the Area Commander commented as follows:

a. Determing the exact source of differences between SARP and actual drift in the subject case cannot be done from the limited data available. The predicted leeway is different enough from observed "actual drift" to imply that factors other than wind effects produced the discrepancy. Note that for a wind of 20 kts and an outboard boat, figure 8-6 of the National SAR Manual gives a leeway of 1.4 kts. Alternately, based on information about the deployment of an anchor, the boat with drogue is a reasonable scenario, with figure 8-6 giving 0.9 kts. A value of 0.22 kts cannot be drawn from the graph with any reasonable assumptions.

b. The probability therefore exists that the "actual drift" computations are in error. Time adrift could be wrong due to the boat being anchored (or dragging anchor). Distance adrift would change significantly if set carried the boat long-shore before shifting toward the recovery position. The deployment of a long cable and anchor would have produced a major leeway uncertainty.

c. Many of the uncertainties expressed above were known during the prosecution of the case, and could have been applied to the search planning process. The Manual and SARP methods could have been used, but the process would have been very tedious and complicated. CASP, however, is designed to handle the drift uncertainties and should have been used, in this case with user-supplied winds and currents (the auto currents are not appropriate to use near shore).

SMALLBOATS-ANCHORING BY THE STERN IS A DANGEROUS PRACTICE

An article in a recent Boating Safety Newsletter warned of the danger in anchoring boats by the stern. It described the detective work of the Fifth Coast Guard District Boating Safety Office in tracking down this cause. They discovered that 15% of the district's fatalities had three things in common:

a. Each boat was under 21 feet in length;

b. Each was anchored by the stern; and

c. Each sunk quickly in small one-foot swells.

Ten people lost their lives in these accidents.

Tests conducted by Bosteam Five proved that anchoring small boats by the stern is indeed a dangerous practice.

NEW FEDERAL EMERGENCY AGENCY FORMED

The President's plan to reorganize the Federal government's emergency preparedness and disaster response programs will become fully implemented in 1979. Since search and rescue is so closely related to the functions absorbed into the new agency, this article will bring you an outline of its structure.

The new agency is the Federal Emergency Management Agency (FEMA). It replaces five existing agencies and assumes six additional disaster related responsibilities. The agencies are:

1. The Defense Civil Preparedness Agency (from the Defense Department) which administers the national civil defense program.

2. The Federal Disaster Assistance Administration (from the Department of Housing and Urban Development), which coordinates and funds federal natural disaster relief operations.

3. The Federal Preparedness Agency (from the General Service Administration) which coordinates civil planning for national emergencies.

4. The Federal Insurance Administration (from the Department of Housing and Urban Development), which manages the flood insurance and hazard reduction programs.

5. The National Fire Prevention and Control Administration (from the Commerce Department), which administers the federal fire prevention program in coordination with state and local governments.

The six additional responsibilities assumed by FEMA are:

1. The community preparedness program for weather emergencies, from the National Weather Service (Department of Commerce).

2. The Earthquake Hazard Reduction Program from the Office of Science and Technology (Executive Office of the President (EOP)).

3. The Dam Safety Coordination Program from the Office of Science and Technology (EOP).

4. The Federal Emergency Broadcast System oversight responsibility from the Office of Science and and Technology (EOP).

5. The coordination of emergency warning (new function).

6. The federal response to consequencies of terrorist incidents (new function).

OBJECTIVES

The reorganization will achieve the following objectives:

a. Make a single agency, and a single official, accountable to the President and Congress for all federal emergency preparedness mitigation and response activities;

b. Create a single point of contact for state and local government, who have strongly urged consolidation of federal emergency programs; and

c. Enhance the dual use of emergency preparedness and response resources at all levels of government by taking advantage of the similarities in planning and response activities for peacetime and attack emergencies.

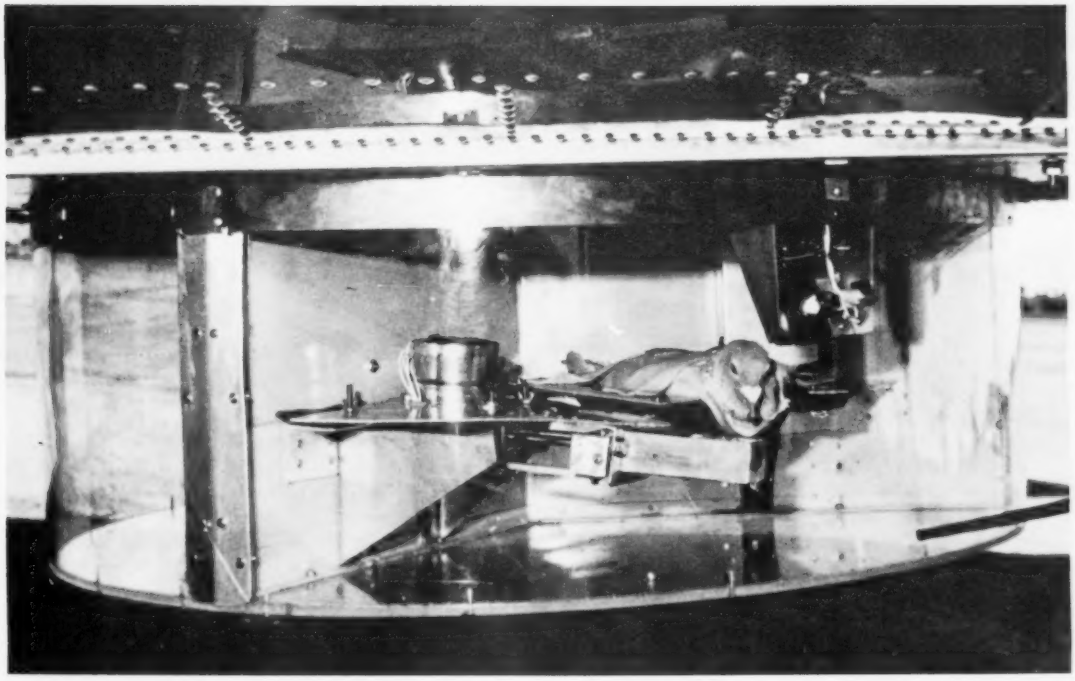
SEARCHING BY MARK II EYEBALL

We've all been complaining for years about the deficiencies of the Mark I (human) eyeball. Now along comes an R&D project which seems to be showing that visual searching is literally "for the birds" with the advent of the Mark II (pigeon) eyeball.

Project SEA HUNT was proposed to the Navy in 1976. It was based on the assumption that trained pigeons could be used as an aid to the crew of an aircraft on a daylight search mission because of the pigeon's superior visual search rate ability. The pigeon is able to process acutely a much larger proportion of a visual field than man in the same amount of time.

The prototype system consisted of three birds harnessed in separate compartments in an observation chamber attached to the underside of a helicopter. (See photos). The birds had been trained to detect orange objects on the ocean surface, and signal their prsence by pecking a response key. The key sends an aural signal to alert the crew to look at the visual display which is also triggered by the key. The display shows the direction in which to concentrate the search.

Four birds were trained and, after initial flight tests with Marine Corps helicopters, the Coast Guard joined in the project.



As you can see from the photos, the birds are harnessed in a 360° viewing compartment, each having a 120° scanning sector. When a bird signals a target sighted, the pilot can tell from his display in which sector the target is located.

In both the Marine Corps and Coast Guard flight tests the pigeons scored way ahead of the humans on first-pass probability of detection (POD). The pigeons obtained a POD of 90% to the human POD of 38%. On first-pass detection trials the pigeons saw the target first 84% of the time, the humans saw it first 15% of the time and both saw it at the same time 1% of the time.

More sophisticated testing and analysis of this promising system are expected during the coming year.

DOES YOUR WET SUIT FIT?

During a recent rescue mission the rescue swimmer was hampered in his attempt due to his wet suit's poor fit. Not only did this poor fitting suit restrict his swimming ability, but it would not have provided adequate protection for the swimmer if required. This problem jeopariadzes both the person in distress and the wearer. For this reason every unit must issue relatively good fitting wet suits to their crewmembers. However, fully custom fitted wet suits are not recommended for many reaons. Only individuals with unusual shapes should be considered for custom fitting.

The primary purpose of the wet suit is to provide hypothermia protection to the wearer. This is achieved by the millions of tiny bubbles in the neoprene foam providing insulation from the cold water. Small amounts of water entering the suit have no serious effect. Loose fitting suits allow relatively large amounts of water to enter or pool inside the suit and almost any movement results in flushing of the suit with cold water which reduces the wearer's body temperature. The wet suits that we recommend for crewmembers are especially designed to allow for constant wear (out of the water) with acceptable discomfort. This is accomplished with a slightly looser fit (than a diver would prefer) plus expansion zippers and velcro closures. With the zippers in the open position they provide approximately three (3) inches of expansion in the torso, arms and legs, which allows for some air to circulate under the suit. Before or after water entry the zippers and velcro closures must be closed. Once the necessary steps have been taken to tighten and seal the suit it must fit relatively snug if it is to be effective.

We do not recommend custom fitting of wet suits for many reasons. Only individuals with unusual shapes should be considered for custom fitting.

IMCO ISSUES NEW MERSAR MANUAL

The Inter-Governmental Maritime Consultative Organization (IMCO) has issued the second edition of the Merchant Ship Search and Rescue Manual (MERSAR).

The edition contains a new chapter on "Assistance by SAR Aircraft" and a revised chapter on "Communications." Minor changes and up-datings have been made to other chapters. The basic instructions for ships to assist in a search and rescue operation (including special search patterns) remain pretty much the same.

A consequential revision to CG-421, Part 1 - Merchant Ship Search and Rescue Manual is expected to be issued to SAR units early in 1979. Until that time, the IMCO publication may be purchased at the following outlets:

New York Nautical Instrument
and Service
140 West Broadway
New York, NY 10013
Price: $7.50

Southwest Instrument Co.
235 West 7th St.
San Pedro, CA 90731
Price: $4.70

Inter-Governmental Maritime
Consultative Organization
101 - 104 Piccadilly
London W1V OAE
England
Price: 1 Pound 50 pence
(approximately $2.50)

44' MLB–NO PLACE TO SOLO

A 44' MLB was recently dispatched on a case with a crew of three. (This is a bare-bones crew under the best of circumstances, and OinC's should carefully review the mission before dispatching with only three.) In this case, the coxswain apparently decided that he could fill all the billets himself, simultaneously. So he sent the other crewmen over to the disabled vessel, to help free a fouled anchor. The transfer was made in ten-foot seas, and one man narrowly avoided being lost, since no one was available to lend a hand.

The coxswain then began his solo cruise. However, with no one to look out or fend off, he quickly managed to set his bow down atop the gunwale of the other vessel, creating a deep impression on both that boat and its owner.

With a three person crew on an MLB, there are no "extra" bodies. If you decide to send even one on an errand, you may not see each other again. If you send all your crewmen to board another boat in rough seas, you've bought a starring role in a disaster movie. Never leave yourself without crew assistance on any boat.

Distribution (SDL No. 108)

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